Tropical Storm Evaluation in the NCEP CFS Reanalysis

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Abstract

In 2011, NCEP released a new high-resolution coupled reanalysis called the Climate Forecast System Reanalysis (CFSR). The CFSR dataset is saved globally at T382 (~38km) spatial resolution and 6-hourly temporal resolution, spanning from 1979 to 2009. This high spatial and temporal resolution allows for realistic tropical storm strength and track evaluations. In order to analyze tropical storm statistics with the CFSR, we have adopted the detection and tracking algorithm devised by Camargo and Zebiak (2002).

Statistics and trajectories of tropical storms in the Northern and Southern Hemisphere are examined and compared to observations. They are broken into seven storm basins. Tropical storms depicted in the CFSR illustrate a reasonable seasonal cycle in all basins, with the exception of the North Indian Ocean basin. The interannual variability of the number of storms is examined. The highest correlations occur in the Atlantic and Western North Pacific basins with values of 0.75 and 0.76, respectively. For these two basins, the estimated Accumulated Cyclonic Energy (ACE) Index is also calculated and compared to observed values. The correlation values increase when using the ACE Index as a measurement of the amount of activity throughout the entire season.

In the CFSR, storms are detected on average at the rate of about 71% during the analysis period in the Atlantic basin, but only 58% over the Eastern North Pacific basin. Of the storms missing in the CFSR analysis, less than 10% on average are above tropical storm strength. An example of a missing storm is Hurricane Floyd in 1981 which was a category 3 hurricane. A more detailed examination of this storm will be included. Erroneous storms (false alarms) are defined as those identified in the analysis as tropical storms but have no correspondence to observations. The percentage of storms that fall under the erroneous category ranges from 11% over the Western North Pacific to 58% over the North Indian basin. The Atlantic basin shows a 30% false alarm rate. Errors in the storm statistics may be attributed to three deficiencies: 1) Errors in the detection method, 2) A spatial resolution that is still too coarse for tropical storm depiction and 3) Erroneous circulation features present in the analysis product.

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